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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/812,436	03/30/2004	Charles R. Pellegrino	N001-5257	3365

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EXAMINER	
UNDERDAHL, THANE E	

ART UNIT	PAPER NUMBER
1651	

DATE MAILED: 11/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/812,436	PELLEGRINO ET AL.	
	Examiner	Art Unit	
	Thane Underdahl	1651	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11, and 16-19* is/are pending in the application.

4a) Of the above claim(s) *16-19* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Restriction/Election

Applicant's response to the species election without traverse filed on 4/13/06 is acknowledged. The applicant elected Group I which includes claims 1-11 and 15. claims will now be examined on the merits. Claims 12-15 are cancelled and claims 16-19 are withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 7, 8 and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 8 uses the term "geometric disposition" and claim 9 uses the term "electrically dissimilar". Neither term is defined in the specification or is an art-recognised term in microbiology, therefore the use of the term and its definition are queried. In the interest of compact prosecution, these terms are excluded from the claims and the both claims will simply read on "wherein the growth substrate is formed of unlike metals".

Claim 7 uses the term "pearlite deposits"

Claim Rejections - 35 USC § 102

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 8 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Iverson (Proc. 3rd Int'l Congress of Marine Corr. And Fouling, 1973) with support from Iverson (International Biodeterioration & Biodegradation 47 (2001) 63–70) and additional support from Metal Suppliers Online (www.suppliersonline.com).

These claims are drawn to a method to produce a mass culture of rusticle consortia (**RC**) by providing a growth substrate, placing a sample on the growths substrate and putting it in a aqueous solution which has a controlled environment that facilitates RC growth. Further limitations include that growth substrate is an annodically charged metal which can be a metal plate. The metal plate is embrittled. Also claims 8 and 9 require the metal plate be made of unlike metals.

Iverson et al. teach a method of culturing *Desulfovibrio* on Mild Steel plates. These icicle-like structures are referred to as rusticles and are the same as those found on the Titanic as supported by Iverson (IBB, 2001, col 1 page 67 Rusticles or Stalactites) so these microorganism meet the definition of RC.

The RC is cultured by placing a mild steel electrode (metal plate) in a culture medium that is inoculated with *Desulfovibrio* cultures in conditions suitable for their grown (Iverson, Proc. Page 63-64 Electrochemical cell). The metal plate is annodically charged (Iverson, Proc. Page 77, Figures 6 and 7).

Iverson uses cold rolled 1020 steel as the metal plate in his experiments. This is an alloy that contains amounts of unlike metals such as Manganese and Phosphorus as supported by Metal Suppliers Online.

Therefore the reference anticipates claims 1-3, 8 and 9.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 4, 5, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iverson as applied to claims 1-3, 8 and 9 (Proc. 3rd Int'l Congress of Marine Corr. And Fouling, 1973) above and in view of (Proc. 3rd Int'l Congress of Marine Corr. And Fouling, 1973) as supported by Jones (Principles and Prevention of Corrosion, 1996) and Cullimore et al. (Rev Environ Contam Toxicol, 2002) and Kalmykov et al. (Materials Science, 1999)

These claims are drawn to the embrittling of the metal plate via hammering it at 3000 p.s.i. for 60 minutes or rolling the plate to promote the formation of lateral pearlite deposits to cause a flaking form of corrosion.

Iverson (Proc., 1973) teach that the culturing of RC is a corrosion reaction between the metal and the *Desulfovibrio* that comprises the RC (see Abstract). Iverson (IBB, 2001) teach that the corrosion cell with *Desulfovibrio* is similar to a typical corrosion cell. Iverson (Proc., 1973) teach that the corrosion rate increases (page 77, Figures 6 and 7) as the RC propagates and increases in size (page 66 paragraph 1). In other words as corrosion of the metal plate increases the RC culture reproduces and so one of ordinary skill in the art would recognized that increasing the corrosion rate will

increase the culture size of the RC. Therefore it would be obvious to one of ordinary skill in the art to increase the corrosion rate of the metal. Jones et al. teach that increasing defects in the metal surface disrupts the protective metal passive layer and increases the corrosion rate (Jones, page 8-9 Passivity). One of ordinary skill in the art would recognize that any common event that disrupts the passive layer will increase the corrosion rate and thus the size of the RC. Since the passive layer is thin and fragile applying force via scratching removes the layer and increases the metals susceptibility to corrosion (as supported by Jones page 116-119, Passive Films). Iverson (Proc 1973) removes the passive layer from his samples via sanding (page 63, Electrochemical Cell). One of ordinary skill in the art would realize that abrasion as well as hammering (rust forming in a car dent) or rolling (stress corrosion cracking) the substrate will also disrupt the passive layer and accelerate corrosion.

One of ordinary skill in the art would recognize that rolling steel produces an increase in the pearlite component of the steel and increase the corrosion rate as supported by Kalmykov (page 291, line 1-3). Therefore, one of ordinary skill in the art would recognize that rolling the steel increases the corrosion rate and that an increase in corrosion rate will translate into increases into the size of the RC.

Hammering the steel will embrittle and disrupt the passive layer allowing fresh active sites for corrosion to occur and thus active sites for RC propagation. One of ordinary skill in the art would also know that the RC that are found growing on the infamous cruise ship Titanic are under 5950 PSI (41,000 KPa) as supported by Cullimore et al. (page 123 1st full paragraph). So it would be prima facia obvious to one

skilled in the art to hammer the metal with high force to disrupt the passive layer to increase the number of active corrosion sites to increase the size of the RC culture.

While the references listed above do not specifically teach the limitation of 3000 psi as seen in claim 5, one of ordinary skill in the art would recognize the force applied to hammering the steel to disrupt the passive layer is a result effective variable. Absent any teaching of criticality by the applicant concerning the force listed in claim 5 it would be *prima facie* obvious that one of ordinary skill in the art would recognize that the pressure listed in claim 5 is a result effective variable which is a matter of routine optimization.

In summary it would have been obvious for the person of ordinary skill in the art to deform the metal substrate when culturing RC to remove the passive layer and expose more active sites for corrosion to occur. One of ordinary skill in the art would recognize that deforming the substrate could be from abrasion (as taught by Iverson), rolling (as taught by Kalmykov) or hammering. Each of these techniques is well know to accelerate corrosion and since the formation of RC is a corrosion process one of ordinary skill in the art would be motivate to accelerate corrosion to accelerate the growth of RC. Iverson (Proc, 1973) provides reasonable expectation of success since he did grow RC in a corrosive environment.

Therefore the references listed above renders the claims above obvious.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iverson (Proc, 1973) and Iverson (IBB, 2001) as applied to the above claims and in further view

of Felkins (JOM, 1998) with additional support from Metal Suppliers Online (www.suppliersonline.com).

This claim is drawn to the method of claim 3 but limits the metal plate to a chemical composition of at least 0.8% phosphorus, 1.2% sulfur and 1.4% manganese. Iverson (Proc, 1973) teach the use of mild steel 1020 to grow RC. This has a composition of 0.04 % phosphorus, 0.05% sulfur, and .6% manganese. Iverson (IBB, 2001) uses steel 1010 which has the same composition of the above metals as 1020. Felkins teach (Table II) that the steel on the Titanic, which grows RC, has a composition of 0.045 % phosphorus, 0.069% sulfur, and .47% manganese.

While none of these meet the limitations of the amounts of the above metals M.P.E.P. § 2144.05 II states:

> Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical.

Futhermore However, the M.P.E.P. § 2145.05 state:

> "a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties."

Absent any teaching of criticality by the applicant concerning the amounts listed in claim 7 for the method of claim 3, it would be *prima facie* obvious that one of ordinary skill in the art would recognize that the amounts listed in claim 7 are result effective variables whose ratio and concentration are a matter of routine optimization.

Therefore the reference(s) listed above renders obvious claim 7.

Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iverson (Proc, 1973) as applied to the claims above in view of ACE-27 (http://faculty.washington.edu/mandoli/methods/media/estocks.html, 2002) as supported by Genny Anderson (http://www.biosbcc.net/ocean/ marinesci/02ocean/swcomposition.htm)

These claims are drawn to a culture medium of water, oxygen and a nutrient substrate containing ferric ammonium citrate and inorganic nutrients. The final pH can be in a range of 7.4 to 8.4

Iverson (Proc, 1973) teach the culturing the RC in an artificial seawater medium containing inorganic nutrients and ferrous ammonium sulfate. However Iverson does not teach the use of ferric ammonium citrate. However another artificial seawater composition ACE-27 uses Fe-citrate. While they do not specifically teach iron ammonium citrate one of ordinary skill in the art would recognize that ferric citrate is sold as ammonium ferric citrate. One of ordinary skill would be motivated to use the ammonium salt because the end solution if it is to mimic seawater should have a pH between 7.5-8.5 as supported by Genny Anderson (page 7 to 8) and the addition of ammonium would reduce the amount of base to be added to adjust the seawater to the alkali pH. It would also add another buffering component to maintain the pH.

It would have been obvious to someone skilled in the art to alter the artificial seawater of Iverson with the artificial seawater of ACE-27. The motivation is provided by ACE-27 whose artificial seawater prechelates iron to provide better solubility at an alkali pH. It would also be obvious to adjust the pH of the solution to the range of 7.5 to

8.5 since that is the natural pH of seawater. The reasonable expectation of success is provided by Iverson who already cultured RC in artificial seawater. Therefore the references listed above renders obvious claims 10 and 11.

In summary no claims, as written, are allowed for this application.

In response to this office action the applicant should specifically point out the support for any amendments made to the disclosure, including the claims (MPEP 714.02 and 2163.06). Due to the procedure outlined in MPEP § 2163.06 for interpreting claims, it is noted that other art may be applicable under 35 U.S.C. § 102 or 35 U.S.C. § 103(a) once the aforementioned issue(s) is/are addressed.

Applicant is requested to provide a list of all copending U.S. applications that set forth similar subject matter to the present claims. A copy of such copending claims is requested in response to this Office action.

CONTACT INFORMATION

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thane Underdahl whose telephone number is (571) 272-9042. The examiner can normally be reached during regular business hours, 8:00 to 17:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn can be reached at (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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